



# KlimaCampus

## European and German Activities

D. Stammer



Universität Hamburg



Zentrum für Marine und  
Atmosphärische Wissenschaften



Max-Planck-Institut  
für Meteorologie



GKSS Forschungszentrum  
Geesthacht



Deutsches Klimarechenzentrum

# COST Action ES1001: SMOS-MODE

- 1st Management Committee meeting:  
Brussels, 14 January 2011
- Further meetings are planned on data issues  
and science:
  - ocean and sea ice
  - soil moisture

# Ocean Science Issues

- Global and regional freshwater budgets, hydrological cycle.
- Surface boundary/barrier layers and vertical mixing
- Freshwater transports
- Impact of freshwater anomalies on circulation and sea level
- Air-sea freshwater fluxes and run-off
  - *Air-sea surface processes*
  - *Horizontal processes*
  - *Vertical processes*
  - *Multi-scale interactions*

# *Approaches:*

- *Observations:*
  - *SMOS Cal/Val: improvements of all kind*
  - *Aquarius Inter-comparison*
- *Combination with in situ data*
- *Modeling of unresolved processes*
- *Role of assimilation: synthesis, parameter estimation, best estimate*



# KlimaCampus

DFG Special  
Research Unit

A new Approach toward Improved  
Estimates of Atlantic Ocean  
freshwater Budgets and Transports  
as Part of the Global Hydrological  
Cycle



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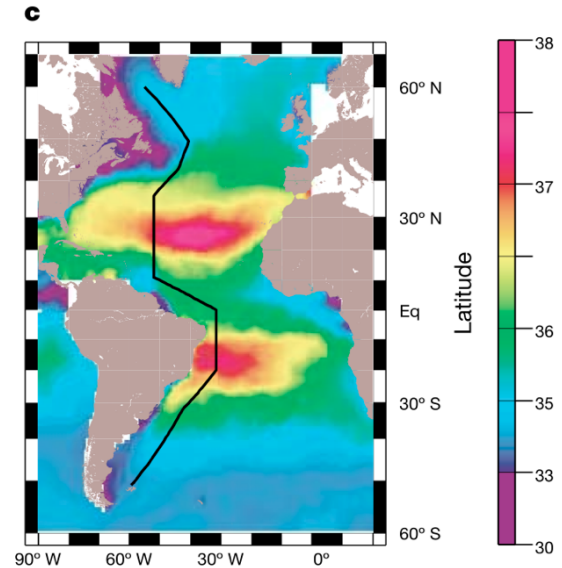
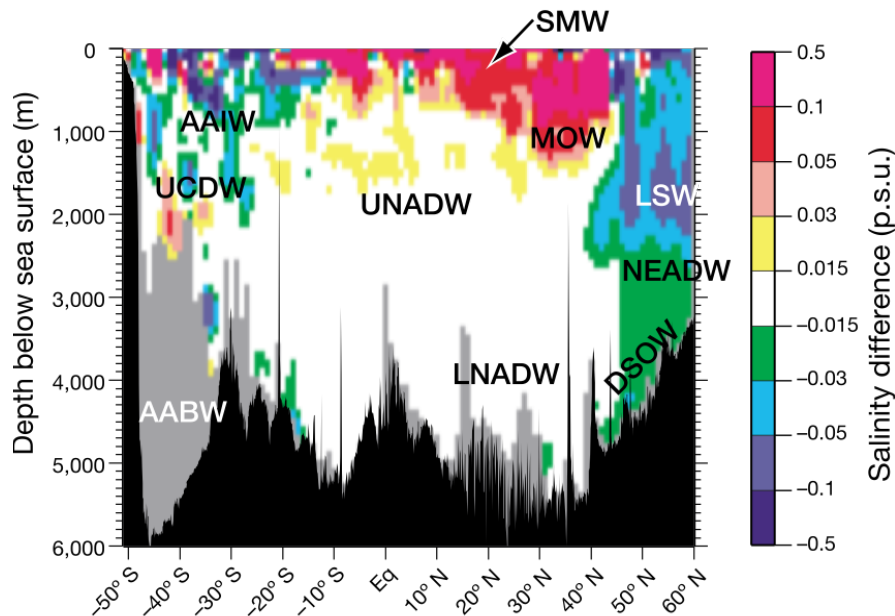


Deutsches Klimarechenzentrum

- **PIs: Detlef Stammer<sup>1</sup>, S. Bakan<sup>7</sup>, P. Brandt<sup>4</sup>, G. Budeus<sup>2</sup>, K. Bumke<sup>4</sup>, C. Eden<sup>1</sup>, E. Fahrbach<sup>2</sup>, K. Fennig<sup>3</sup>, R. Gerdes<sup>2</sup>, G. Heygster<sup>5</sup>, L. Kaleschke<sup>1</sup>, A. Macke<sup>6</sup>, M. Rhein<sup>5</sup>, A. Köhl<sup>1</sup>, U. Schauer<sup>2</sup>**

- 1. KlimaCampus, Universität Hamburg,**
- 2. Alfred Wegener Institute, Bremerhaven**
- 3. Deutscher Wetterdienst (DWD)**
- 4. IFM-GEOMAR**
- 5. Institut für Umweltphysik, Universität Bremen**
- 6. Institut für Troposphärenforschung, Leipzig**
- 7. Max Planck Institut für Meteorologie**

# Temporal Changes in Salinity



Changes in salinity along a virtual section between 1985–99 and 1955–69 as inferred by Curry et al (2003).

# Key Scientific Questions

- What is the variability of salinity in the Atlantic on sub-seasonal to decadal time scale and what role plays surface forcing (E-P-R) vs. lateral transports of freshwater in modulating the local salinity content of the Atlantic?
- How does surface freshwater forcing influence ocean mixed layer dynamics in both the tropics and high latitudes of the Atlantic, how does it regulate heat exchange with the atmosphere, and how do these processes feedback on ocean-atmosphere coupling on intra-seasonal, seasonal and interannual time scales?



# Key Scientific Questions

- What is the role of the observed changes in surface forcing and sea ice for the regional and basin scale salinity budget and how can we improve our estimates of those processes to close the water budget of the Atlantic Ocean and to understand the role of the Atlantic in the global hydrological cycle?
- How do varying surface fluxes of freshwater and heat generate temperature-salinity anomalies in mid-latitude central waters and how are such anomalies incorporated and transported in the low-latitude subducted water masses?
- What are the implications of changes in the global salinity distribution and the potential changes in the distribution of the partial pressure of  $\text{CO}_2$  in seawater ( $p\text{CO}_2$ ), owing to the fact that  $p\text{CO}_2$  is a function of salinity as well as temperature and a number of other parameters?

# Proposed Elements

- (1) Observations,
- (2) Modeling,
- (3) Cal/Val and Innovation,
- (4) Assimilation and Synthesis.

